IOP Conference Series: Materials Science and Engineering 2016 vol.158 N1

Acoustic impact on the laminated plates placed between barriers

Paimushin V., Gazizullin R., Fedotenkov G.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© Published under licence by IOP Publishing Ltd.On the basis of previously derived equations, analytical solutions are established on the forced vibrations of two-layer and three-layers rectangular plates hinged in an opening of absolutely rigid walls during the transmission of monoharmonic sound waves. It is assumed that the partition wall is situated between two absolutely rigid barriers, one of them by harmonic oscillation with a given displacements amplitude on the plate forms the incident sound wave, and the other is stationary and has a coating of deformable energy absorbing material with high damping properties. The behavior of acoustic environments in the spaces between the deformable plate and the barriers described by classical wave equation based on the ideal compressible fluid model. To describe the process of dynamic deformation of the energy absorbing coating of fixed barrier, two-dimensional equations of motion based on the use of models transversely soft layer are derived with a linear approximation of the displacement field in the thickness direction of the coating and taking into account the damping properties of the material and the hysteresis model for it. The influence of the physical and mechanical properties of the concerned mechanical system and the frequency of the incident sound wave on the parameters of its insulation properties of the plate, as well as on the parameters of the stress-strain state of the plate has been analyzed.

http://dx.doi.org/10.1088/1757-899X/158/1/012075